DISTRIBUTION AND STATUS OF *GORTYNA BORELII* PIERRET SSP. *LUNATA* FREYER (LEP.: NOCTUIDAE) IN SOUTH-EAST ENGLAND

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Abstract

Gortyna borelii lunata Freyer is a rare moth that has only ever been recorded in Britain from the Walton Backwaters area of the North Essex coast. This paper reports the first British population of the species outside this area and compares the two sites. The vegetative conditions differed considerably between the sites, but both support a substantial population of the moth. The discovery of a second population of *G. borelii lunata* will help to secure the future of this species in Britain.

Introduction

Fisher's Estuarine moth (*Gortyna borelii* Pierret 1837, subspecies *lunata* Freyer 1839) is a large noctuid moth with a localised sporadic but widespread distribution in Europe (Ippolito & Parenzan, 1978; Karsholt & Razowski, 1996). In the United Kingdom, the moth has been, to date, recorded only from the Walton Backwaters area of the north Essex coast (Skinner, 1998; Gibson, 2000).

From a historical point of view, *G. borelii lunata* has a relatively recent status in the United Kingdom. In 1968, the first specimens were taken by J. B. Fisher near to the Walton Backwaters area in north-east Essex (Fisher, 1971). Sporadic reports of the moth came throughout the period 1970 to date. Recently a more detailed study of *G. borelii lunata* has examined the life cycle of the moth and its habitat (Ringwood *et al.*, 2000).

The status of the moth in the United Kingdom is "Vulnerable" and it is listed in Category 2 of the *British Red Data Books* (Shirt, 1987). The larval foodplant, *Peucedanum officinale* L. (Hog's Fennel), is also listed within the *British Red Data Books* (Wiggington, 1999) as Lower Risk (Near Threatened). The vulnerable nature of the moth and its habitat led to the species being added, in 1998, to Schedule 5 of the Wildlife and Countryside Act 1981 (Gibson, 2000). *Gortyna borelii lunata* is also included in the Essex Biodiversity Action Plan (Thompson & McClean, 1999) and the Butterfly Conservation Regional Action Plan (Joy & Bourn, 2000) and listed within the Species Recovery Programme of English Nature.

The threats to *G. borelii lunata* in the United Kingdom are many. The principal ones are the vulnerability of the habitat to sea level rise, unsympathetic management of sea defences and land immediately adjacent to the sea wall, scrub encroachment, low population numbers of moth and the illegal collection of specimens. It has been estimated that the Walton Backwaters support approximately 60% of the United Kingdom population of *P. officinale* (Wiggington, 1999). However, the host plant does occur in other locations in the United Kingdom. Stands of Hogs Fennel outside the Walton Backwaters occur in north Kent (Randall & Thornton, 1996) and in south

Suffolk; however, these stands are not as extensive as those occurring in north-east Essex. This paper reports survey work performed at a known site for *P. officinale* and *G. borelli lunata* and a new site in South East England outside of the current population areas in Essex. The results from the two sites are compared in terms of vegetation, incidence of *G. borelii lunata* larval feeding signs and observations of imagines.

Survey Procedures

In July 2001, during the large larval stage of *G. borelii lunata*, the vegetation structure of the sites of *P. officinale* in two locations in south east England (Sites A and B) were surveyed by a quadrat method (10 x $1m^2$). Within each quadrat, the following details were recorded: number of *P. officinale* plants, the height and width of each of these plants, number of *G. borelii lunata* larval feeding signs, the height of the grass, and percentage cover of each of the species of plant present. The percentage cover of vegetation was reported using the Braun-Blanquet Scale (Bullock, 1996) when analysing the data. To obtain an indication of the density of larval feeding signs at each of the sites, one hundred *P. officinale* plants were selected at random, examined, and the proportion with large larval feeding signs was recorded.

An indication of the abundance of *G. borelii lunata* imagines at each of the sites was recorded using an adapted version of the well-established butterfly monitoring transect method (Pollard, 1977). The method involved setting out a transect route at both of the sites, which incorporated all the main stands of *P. officinale*. The transects were walked, at a slow pace, once a week at each of the sites during the flight period of the moth (from the beginning of September to the end of October). Torchlight was used to sight *G. borelii lunata*, and all moths of this species observed 5m from the observer walking the transect were recorded. At the start and finish of each of the transect surveys, details of the weather conditions were noted, including temperature, cloud cover and wind speed (data not shown). All surveys were conducted between 8pm and midnight.

Results and Discussion

Site A consisted of an area covering approximately $17,500m^2$ with a highest point of 20m OD, whereas Site B was extant over an estimated $22,700m^2$ with a highest point of just 3m OD. Table 1 illustrates differences in the structure of vegetation of the two sites. These differences consisted of the density of *P. officinale* being greatest at the Site B, and the mean height and width of the larval foodplant being highest at Site A.

The main species of grass associated with *P. officinale* at Sites A and B were *Arrhenatherum elatius* and *Elytrigia atherica* respectively (Table 1). The incidence of *Elytrigia atherica* at Site A was low (less than 5% of total vegetation cover). Ringwood *et al.* (2000) suggested that the main oviposition host plant was *Elytrigia atherica* at Site B. This opinion was suggested as the grass species predominated at the sites and possessed the correct morphological characteristics (glabrous leaves and pseudo-stems and rolled leaf sheaths). However, ovipositing was also observed on *Arrhenatherum elatius* and *Dactylis glomerata,* but to a limited extent. As Site A is dominated by *Arrhenatherum elatius*, the likelihood that that species of grass is the main oviposition host plant is high (Table 1).

Table 1. Vegetation characteristics of *Peucedanum officinale* sites

Parameter	Site A	Site B
Mean No. *Peucedanum officinale* per m^2	1.2	2.8
Mean height of *Peucedanum officinale* L. (cm)	130.4	84.4
Mean width of *Peucedanum officinale* L. (cm)	97.4	52.1
Mean sward height (cm)	75.7	81.9
Median Braun–Blanquet score for *Elytrigia* spp.	1	3
Median Braun– Blanquet score for *Arrhenatherum*	3	1

The percentage of *P. officinale* plants with large larval feeding signs was 46 at Site A and 38 at Site B. However, the mean number of imagines observed per adult transect walk was highest at Site B (Table 2).

Table 2. Incidence of *Gortyna borelii lunata*large larval borings and adults at Sites A and B.

Parameter	Site A	Site B
% *Peucedanum officinale* with signs of *Gortyna borelii lunata* large larval borings	46	38
Imago observed between 1 September and 1 November (mean and range of nine transect walks)	18 (0 to 51)	20 (0 to 40)
Total number (over nine weeks) of imago observed per 1000m of the transect	123	160
Date of peak numbers flying	11 October	1 October

The observations of large larval feeding signs and emerging imagines at Site A represent the first recorded population of *G. borelii lunata* outside the Walton Backwaters area of north Essex. The total population of imagines observed throughout the flight period differed in number and distribution considerably between the two sites (Fig. 1). At Site A, the population appeared to increase gradually and peaked on survey 6 (11 October 2001) before decreasing drastically on survey 7 (18 October 2001). The number of adults recorded at Site B, however, increased sharply early on in the season and then appeared to remain stable for three surveys before declining more gradually. The flight period may be later at Site A due to topographical reasons (a relatively exposed site). The greatest numbers of the moth at both sites were recorded when the weather conditions were overcast and relatively mild.

The existing sites in north Essex where *G. borelii lunata* have been observed are vulnerable to sea level rise, unsympathetic management and scrub encroachment. The issue of sea level rise does not, however, affect Site A. Unsympathetic management of the site, damage as a result of amenity use and tourism, and illegal collection are the main threats to the population of the moth at Site A. These issues may pose significant problems to regional and national conservation bodies.

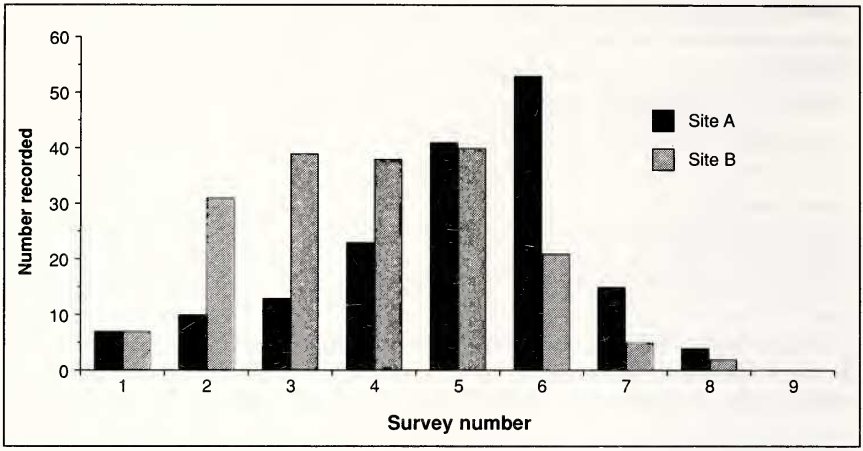

Figure 1. The number of *Gortyna borelii lunata* recorded in each of the Site A and Site B adult transect surveys.

Conclusion

The discovery of a second *G. borelii lunata* population in Britain will help to secure the long-term future of this moth here and has enhanced our understanding of the habitat requirements of the species. However, two issues remain unanswered. The relatively recent occurrence of the moth in the United Kingdom is difficult to explain. The moth is relatively large (50 to 60 mm wingspan) with distinct wing morphological characteristics and is clearly distinguishable from other species of *Gortyna* (for instance *Gortyna flavago*). The current populations in the United Kingdom may be remnants of more extensive historical populations in the north-western Palaearctic or may have been introduced at some time in the recent past. Secondly, the taxonomic status of the moth is still not clear. The status of the United Kingdom populations as subspecies *lunata* was thought to be based originally on differences in wing morphology and colouration (M. Honey *pers comm*). However, specimens of *G. borelii lunata* collected in Hungary and Romania, and of *G. borelii* in Germany show substantial phenotypic variation and it has been suggested by lepidopterists in these countries that *lunata* is not a true subspecies (Axel Steiner, pers. comm.; Laszlo Peregovits, pers. comm.). It is, therefore, suggested that a re-appraisal of the status of the moth in the United Kingdom should be made to clarify the taxonomic position of the *G. borelii lunata*.

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CAN YOU SPARE A MOTH LEG?

A genetic study, funded by English Nature, is being conducted to examine the taxonomic status of Fisher's Estuarine Moth *Gortyna borelii lunata*. The project aims to compare the DNA of *G. borelii* specimens from across Europe and to determine whether separation into the subspecies *lunata* is justified. It will also provide information on the genetic variation of the species across its range and determine which populations are the most similar to one another. The work will be conducted using leg material from museum/private collection specimens **from as many different European populations as possible**. At present I am in the process of acquiring material to work from. If anybody has Fisher's Estuarine Moth specimen(s) and would be prepared to donate one of its legs for use in this DNA study please contact Zoë Ringwood at **zkr@writtle.ac.uk** or UK telephone number **01277-655392.** Please do not detach and send legs at this stage – just inform me of what material you have available.